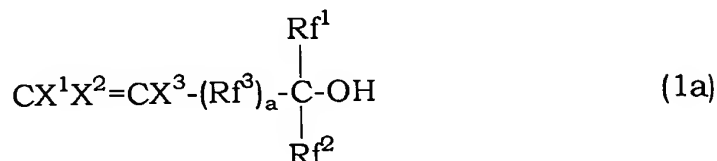


WHAT IS CLAIMED IS:

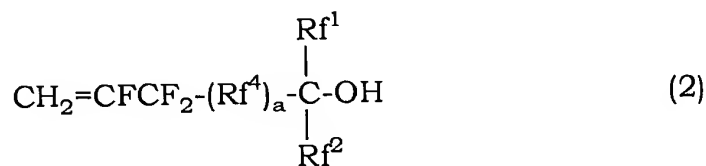
1. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (1a):

5



10 wherein  $\text{X}^1$  and  $\text{X}^2$  are the same or different and each is H or F;  $\text{X}^3$  is H, F, Cl or  $\text{CF}_3$  (at least one of  $\text{X}^1$ ,  $\text{X}^2$  and  $\text{X}^3$  is H and  $\text{X}^1$ ,  $\text{X}^2$  and  $\text{X}^3$  are not H at the same time);  $\text{Rf}^1$  and  $\text{Rf}^2$  are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms;  $\text{Rf}^3$  is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon  
15 atoms and the sum of carbon atom and oxygen atom of two or more; a is 0 or 1.

2. A fluorine-containing ethylenic monomer having hydroxyl  
20 represented by the formula (2):

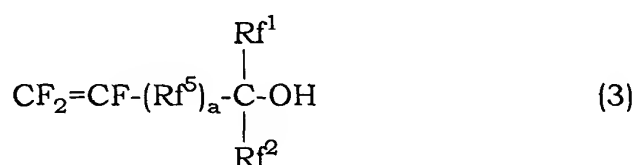


25

wherein  $\text{Rf}^1$  and  $\text{Rf}^2$  are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms;  $\text{Rf}^4$  is a fluorine-containing alkylene

group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is 0 or 1.

- 5                    3. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (3):

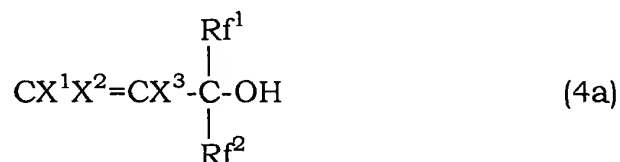


10

wherein  $\text{Rf}^1$  and  $\text{Rf}^2$  are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms;  $\text{Rf}^5$  is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is 0 or 1.

15

4. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (4a):



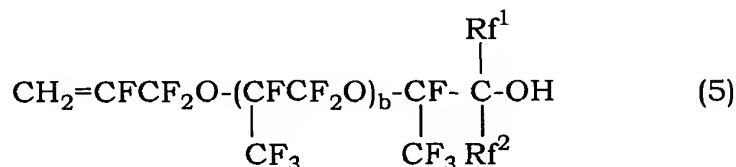
20

25    wherein  $\text{X}^1$  and  $\text{X}^2$  are the same or different and each is H or F;  $\text{X}^3$  is H, F, Cl or  $\text{CF}_3$  (at least one of  $\text{X}^1$ ,  $\text{X}^2$  and  $\text{X}^3$  is H and  $\text{X}^1$ ,  $\text{X}^2$  and  $\text{X}^3$  are not H at the same time);  $\text{Rf}^1$  and  $\text{Rf}^2$  are the same or different and each is a

perfluoroalkyl group having 1 to 20 carbon atoms.

5. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (5):

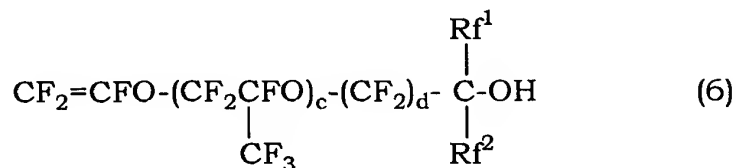
5



10 wherein Rf<sup>1</sup> and Rf<sup>2</sup> are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; b is an integer of from 1 to 13.

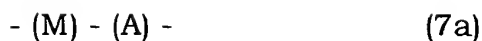
6. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (6):

15



20 wherein Rf<sup>1</sup> and Rf<sup>2</sup> are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; c is an integer of from 1 to 13; d is an integer of from 1 to 5.

7. A fluorine-containing polymer having a number average  
25 molecular weight of from 500 to 1,000,000 represented by the formula (7a):



wherein the structural unit M is a structural unit derived from the  
fluorine-containing ethylenic monomer having hydroxyl of Claim 1  
5 which is represented by the formula (1a), the structural unit A is a  
structural unit derived from monomer copolymerizable with the  
structural unit M,  
and the structural unit M and the structural unit A are contained in  
amounts of from 0.1 to 100 % by mole and from 0 to 99.9 % by mole,  
10 respectively.

8. A fluorine-containing polymer having a number average  
molecular weight of from 500 to 1,000,000 represented by the formula  
(7b):

15



wherein the structural unit M is a structural unit derived from the  
fluorine-containing ethylenic monomer having hydroxyl of Claim 3  
20 which is represented by the formula (3), the structural unit A is a  
structural unit derived from monomer copolymerizable with the  
structural unit M,  
and the structural unit M and the structural unit A are contained in  
amounts of from 0.1 to 100 % by mole and from 0 to 99.9 % by mole,  
25 respectively.

9. A fluorine-containing polymer having a number average

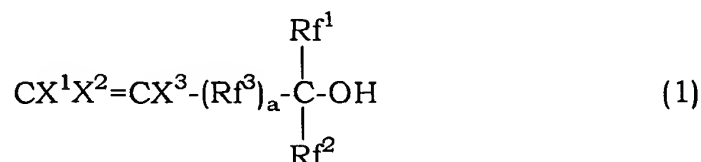
molecular weight of from 500 to 1,000,000 represented by the formula (7):



5

wherein the structural unit M is a structural unit derived from a fluorine-containing ethylenic monomer having hydroxyl represented by the formula (1):

10



wherein  $X^1$  and  $X^2$  are the same or different and each is H or F;  $X^3$  is H, F, Cl or  $CF_3$ ;  $Rf^1$  and  $Rf^2$  are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms;  $Rf^3$  is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is 0 or 1, the structural unit A is a structural unit derived from a fluorine-containing ethylenic monomer copolymerizable with the structural unit M except the monomer of the formula (1a), and the structural unit M and the structural unit A are contained in amounts of from 0.1 to 100 % by mole and from 0 to 99.9 % by mole, respectively.

25

10. The fluorine-containing polymer of Claim 9, wherein the

structural unit A is at least one selected from fluorine-containing ethylenic monomers represented by the formula (8):

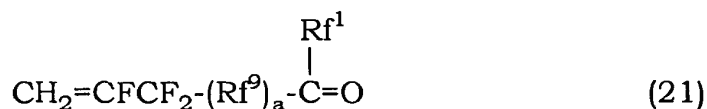


5

wherein  $X^4$  and  $X^5$  are the same or different and each is H or F;  $X^6$  is H, F or  $CF_3$ ;  $X^7$  is H, F, Cl or  $CF_3$ ; at least one of  $X^4$ ,  $X^5$ ,  $X^6$  and  $X^7$  is F or  $CF_3$ .

10

11. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (21):



15

wherein  $Rf^1$  is a perfluoroalkyl group having 1 to 20 carbon atoms;  $Rf^9$  is a fluorine-containing alkylene group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms; a is 0 or 1.

20

12. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (23):



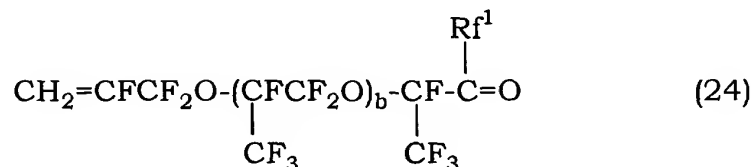
25

wherein  $X^1$  and  $X^2$  are the same or different and each is H or F;  $X^3$  is H,

F, Cl or CF<sub>3</sub>; Rf<sup>1</sup> is a perfluoroalkyl group having 1 to 20 carbon atoms.

13. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (24):

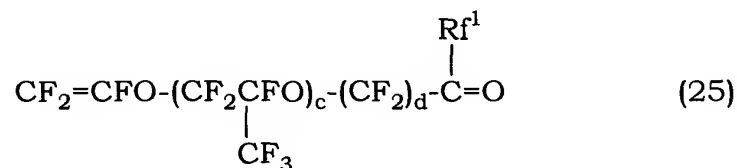
5



10 wherein Rf<sup>1</sup> is a perfluoroalkyl group having 1 to 20 carbon atoms; b is an integer of from 1 to 13.

14. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (25):

15



20 wherein Rf<sup>1</sup> is a perfluoroalkyl group having 1 to 20 carbon atoms; c is an integer of from 1 to 13; d is an integer of from 1 to 5.

15. A photoresist composition which is a composition comprising:

25 (A) a fluorine-containing polymer having, as an essential component, a structural unit obtained by polymerizing a fluorine-containing ethylenic monomer having OH group,

(B) a photoacid generator, and

(C) a solvent,

in which, when the carbon atom bonded to OH group of the fluorine-containing ethylenic monomer having OH group is named the first carbon atom, and a structure consisting of the first carbon atom up to the neighboring third or fourth carbon atom is assumed to be a model structure, the fluorine-containing ethylenic monomer having OH group satisfies Equation 1:

10 
$$\Delta H = H(M-O^-) + 200 - H(M-OH) \leq 75 \quad (\text{Equation 1})$$

wherein  $H(M-OH)$  is a produced enthalpy of the model structure,  $H(M-O^-)$  is a produced enthalpy of the fluorine-containing ethylenic monomer after dissociation of the OH group and a produced enthalpy of hydrogen ion is assumed to be a constant of 200 kJ/mol.

16. The photoresist composition of Claim 15, wherein the fluorine-containing ethylenic monomer having OH group satisfies Equation 2:

20 
$$\Delta H = H(M-O^-) + 200 - H(M-OH) \leq 70 \quad (\text{Equation 2}).$$

17. A photoresist composition which is a composition comprising:

25 (A) a fluorine-containing polymer having, as an essential component, a structural unit obtained by polymerizing a fluorine-containing ethylenic monomer having OH group,



(B) a photoacid generator, and

(C) a solvent,

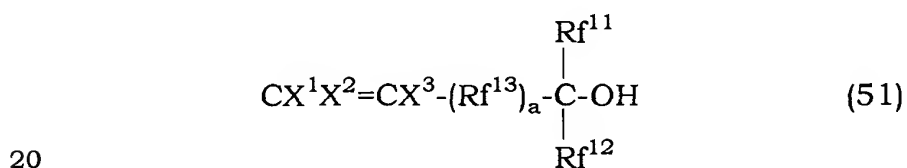
in which the fluorine-containing ethylenic monomer having OH group has a structure represented by the formula (50):

5



10 wherein Rf<sup>11</sup> and Rf<sup>12</sup> are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Z is fluorine atom or a perfluoroalkyl group having 1 to 20 carbon atoms.

18. The photoresist composition of Claim 15, in which the  
15 fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (51):

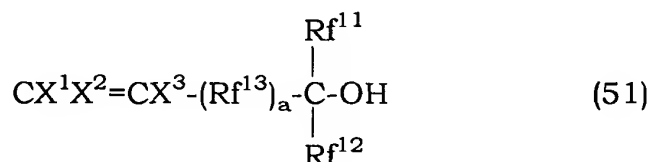


20

wherein X<sup>1</sup> and X<sup>2</sup> are the same or different and each is H or F; X<sup>3</sup> is H, F, Cl or CF<sub>3</sub>; Rf<sup>11</sup> and Rf<sup>12</sup> are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf<sup>13</sup> is a fluorine-  
25 containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is

0 or 1.

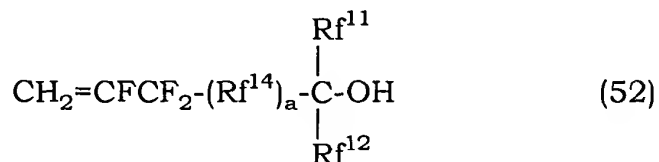
19. The photoresist composition of Claim 17, in which the  
fluorine-containing ethylenic monomer having OH group is a fluorine-  
5 containing ethylenic monomer represented by the formula (51):



10

wherein  $\text{X}^1$  and  $\text{X}^2$  are the same or different and each is H or F;  $\text{X}^3$  is H,  
F, Cl or  $\text{CF}_3$ ;  $\text{Rf}^{11}$  and  $\text{Rf}^{12}$  are the same or different and each is a  
perfluoroalkyl group having 1 to 20 carbon atoms;  $\text{Rf}^{13}$  is a fluorine-  
containing alkylene group having 1 to 40 carbon atoms or a fluorine-  
15 containing alkylene group having ether bond which has 1 to 100 carbon  
atoms and the sum of carbon atom and oxygen atom of two or more; a is  
0 or 1.

20. The photoresist composition of Claim 15, wherein the  
20 fluorine-containing ethylenic monomer having OH group is a fluorine-  
containing ethylenic monomer represented by the formula (52):



25

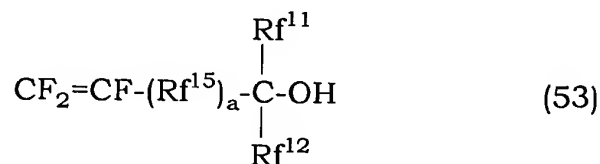
wherein  $\text{Rf}^{11}$ ,  $\text{Rf}^{12}$  and a are as defined in the formula (51);  $\text{Rf}^{14}$  is a

fluorine-containing alkylene group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms and the sum of carbon atom and oxygen atom of two or more.

5

21. The photoresist composition of Claim 15, wherein the fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (53):

10

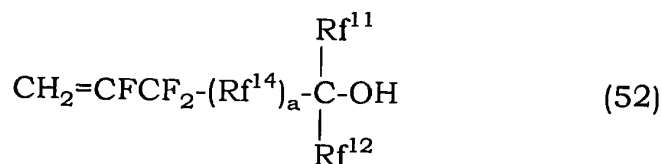


wherein  $\text{Rf}^{11}$ ,  $\text{Rf}^{12}$  and  $a$  are as defined in the formula (51);  $\text{Rf}^{15}$  is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more.

20

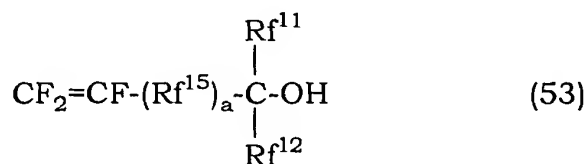
22. The photoresist composition of Claim 17, wherein the fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (52):

25



wherein  $Rf^{11}$ ,  $Rf^{12}$  and  $a$  are as defined in the formula (51);  $Rf^{14}$  is a fluorine-containing alkylene group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms and the sum of carbon atom and oxygen atom of two or more.

23. The photoresist composition of Claim 17, wherein the fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (53):



wherein  $Rf^{11}$ ,  $Rf^{12}$  and  $a$  are as defined in the formula (51);  $Rf^{15}$  is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more.

24. A photoresist composition which is a composition comprising:

(A) a fluorine-containing polymer having, as an essential component, a structural unit derived from a fluorine-containing ethylenic monomer having functional group comprising OH group and a protective group which protects the OH group and can change the functional group to the OH group through a reaction by an acid,

(B) a photoacid generator, and

(C) a solvent,

wherein the fluorine-containing polymer (A) is a fluorine-containing polymer obtained by polymerizing the fluorine-containing ethylenic monomer having OH group of Claim 15, in which the monomer has functional group comprising said protective group protecting the OH group.

25. A photoresist composition which is a composition comprising:

(A) a fluorine-containing polymer having, as an essential component, a structural unit derived from a fluorine-containing ethylenic monomer having functional group comprising OH group and a protective group which protects the OH group and can change the functional group to the OH group through a reaction by an acid,

(B) a photoacid generator, and

(C) a solvent,

wherein the fluorine-containing polymer (A) is a fluorine-containing polymer obtained by polymerizing the fluorine-containing ethylenic monomer having OH group of Claim 17, in which the monomer has functional group comprising said protective group protecting the OH group.